Pacific Gas and Electric Company

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PG&E Letter DCL-99-156

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555 - 0001

Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
Licensee Event Report 1-1999-009-00
Manual Reactor Trips Due to Heavy Debris Loading of Traveling Screens During a Pacific Ocean Storm

Dear Commissioners and Staff:

Pursuant 10 CFR 50.73(a)(2)(iv), PG&E is submitting the enclosed licensee event report regarding Units 1 and 2 manual reactor trips due to heavy debris loading of traveling screens during a Pacific Ocean storm.

This event did not adversely affect the health and safety of the public.

Sincerely,

David H. Oatley

cc: Steven D. Bloom
Ellis W. Merschoff
David L. Proulx
Diablo Distribution
INPO

Enclosure

DDM/2246/N0002107

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Diablo Canyon Unit 1	0 5 0 0 0 2 7 5	1 OF 8

TITLE (4)

Manual Reactor Trips Due to Heavy Debris Loading of Traveling Screens During a Pacific Ocean Storm

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
10	28	1999	1999	- 0 0 9 -	0 0	11	29	1999	Diablo Canyon Unit 2	0 5 0 0 0 3 2 3

OPERATING MODE (9)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (11)	
1	X	10 CFR 50.73(a)(2)(iv)
POWER LEVEL (10)		OTHER
0 5 0	(SPECIFY IN ABSTRACT BELOW AND IN TEXT, NRC FORM 366A)	

LICENSEE CONTACT FOR THIS LER (12)

	TELEPHONE NUMBER	
	AREA CODE	
Roger L. Russell - Senior Regulatory Services Engineer	805	545-4327

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED	MON	DAY	YR
[ ] YES (If yes, complete EXPECTED SUBMISSION DATE)	[X] NO	SUBMISSION DATE (15)			

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines.) (16)

On October 28, 1999, at 1359 PDT, with Unit 2 in Mode 1 (Power Operation) at approximately 30 percent power, and at 1400 PDT, with Unit 1 in Mode 1 at 50 percent power, plant operators initiated manual reactor trips as required by Operating Procedure AP-7, "Degraded Condenser." The trips were required when differential pressure across the intake water traveling screens exceeded limits due to sudden heavy debris loading from a major Pacific Ocean storm. The units were stabilized in Mode 3 (Hot Standby) in accordance with emergency procedures. A 4-hour, non-emergency report was made to the NRC, in accordance with 10 CFR 50.72(b)(2)(ii), at 1520 PDT.

PG&E previously added screen rakes and debris grinders to the seawater cooling system to improve debris removal. Operator training was enhanced regarding loss of circulating water system screen functions.

PG&E cannot entirely eliminate the potential need to expedite manual reactor trips when high seas and dislodged plant life from the ocean bottom result in heavy debris loading on the traveling screens. PG&E will designate an operations management team to focus on lessons learned and streamline the coping strategy decision making process during storm warning conditions.

TEXT

I. Plant Conditions

Unit 1 was in Mode 1 (Power Operation) at 50 percent power and continuing to reduce power as a prudent severe weather management measure. Unit 2 was in Mode 1 at 30 percent power to perform startup testing to conclude the ninth refueling outage (2R9).

II. Description of Problem

A. Summary

On October 28, 1999, at 1359 PDT, with Unit 2 in Mode 1 (Power Operation) at approximately 30 percent power, and at 1400 PDT, with Unit 1 in Mode 1 at 50 percent power, plant operators initiated manual reactor (AA)(RCT) trips as required by Operating Procedure AP-7, "Degraded Condenser." The trips were required when differential pressure (dp) across the intake water (KE) traveling screens exceeded limits due to sudden heavy debris loading from a major Pacific Ocean storm. The units were stabilized in Mode 3 (Hot Standby) in accordance with emergency procedures. A 4-hour, non-emergency report was made to the NRC, in accordance with 10 CFR 50.72(b)(2)(ii), at 1520 PDT.

B. Background

The circulating water system (KE) provides a continuous saltwater supply to the main condenser (COND), condensate cooler (CLR), service water cooling system (KG), and intake cooling system (KE). The saltwater enters the cooling water intake structure by passing through bar racks and then through traveling screen assemblies. Each unit has two single-stage circulating water pumps (CWP) and each CWP has three traveling screens. The bar racks and traveling screens prevent floating debris and sea life from entering the system and restricting flow through the main condenser.

The screens for the CWPs are operated either in manual or automatic. When in manual, the screens are controlled by the operator and can be operated in slow or high speed.

OP AP-7 provides guidance for plant operators in response to a loss of condenser vacuum, condenser fouling, and traveling screen problems. Using the dp measured across the traveling screens, the procedure

TEXT

provides guidance as to when to secure a CWP and when to manually trip the reactor in order to prevent excessive damage to the traveling screens.

C. Event Description

On October 28, 1999, at 0900 PDT, the plant safety review committee (PSRC) reviewed the high swell warning predicted by the biofouling group in accordance with Operating Order O-28: "Intake Management." As a conservative measure the PSRC recommended Unit 1 power be reduced to approximately 60 percent. No restrictions were identified for Unit 2, which was being maintained at approximately 30 percent power for testing, during return to power following the ninth refueling outage.

On October 28, 1999, at 1100 PDT, the high Pacific Ocean swell warning went into effect.

On October 28, 1999, at 1200 PDT, Unit 1 initiated a 3 MW per minute decrease in power from 100 percent to approximately 60 percent.

On October 28, 1999, at 1357 PDT, with Unit 1 at approximately 70 percent power, a traveling screen high dp or screens not in motion alarm was received. Plant operators expedited a decrease in Unit 1 power at 200 MW per minute. A Unit 2 traveling screen high dp or screens not in motion alarm was received. Plant operators tripped Unit 2 CWP 2-1.

On October 28, 1999, at 1358 PDT, the Unit 1 CWP 1-1 was tripped.

On October 28, 1999, at 1359 PDT, a Unit 2 manual reactor trip was initiated and CWP 2-2 was tripped. Plant operators closed the Unit 2 main steam isolation valves (MSIVs) to prevent additional steam flow to the main condenser.

On October 28, 1999, at 1400 PDT a Unit 1 manual reactor trip was initiated and CWP 1-2 was tripped. Plant operators closed the Unit 1 MSIVs to prevent additional steam flow to the main condenser.

On October 28, 1999, at 1401 PDT a Unit 1 Unit trip actuated, offsite power transferred from the auxiliary (main generator output) transformer to the startup (second offsite power source). A transient 4 KV Bus F and H undervoltage condition was sensed, initiating a valid start of emergency diesel generators (DG) 1-3 and DG 1-1, respectively. The

TEXT

DGs started but did not load as designed.

On October 28, 1999, at 1520 PDT, with Units 1 and 2 stabilized in Mode 3, a 4-hour, non-emergency report was made in accordance with 10 CFR 50.72(b)(2)(ii).

D. Inoperable Structures, Components, or Systems that Contributed to the Event

None.

E. Dates and Approximate Times for Major Occurrences

1. October 28, 1999, at 1359 PDT: A Unit 2 reactor trip was initiated in accordance with plant procedural guidance due to heavy debris loading of the intake cooling water traveling screens.

2. October 28, 1999, at 1400 PDT: A Unit 1 reactor trip was initiated in accordance with plant procedural guidance due to heavy debris loading of the intake cooling water traveling screens.

3. October 28, 1999, at 1520 PDT Units 1 and 2 were stabilized in Mode 3 and a 4-hour, non-emergency report was made in accordance with 10 CFR 50.72(b)(2)(ii).

F. Other Systems or Secondary Functions Affected

None.

G. Method of Discovery

The event was immediately apparent to plant operators due to alarms and indications received in the control room.

TEXT

H. Operator Actions

Licensed plant operators in the control room responded in accordance with established emergency procedures. Operators confirmed the reactor trip, verified expected engineered safety feature actuations, and initiated other manual actions to stabilize Units 1 and 2 in Mode 3 .

I. Safety System Responses

1. The reactor trip breakers (JC)(BKR) opened.

2. The main turbine (TA)(TRB) tripped.

3. The control rod drive mechanism (AA)(DRIV) allowed the control rods to drop into the core.

4. The motor driven auxiliary feedwater pumps (BA)(P) started.

5. All containment fan coolers (EK)(FAN) started.

6. Unit 1 DG 1-1 and 1-3 started but did not load to the 4 kV bus as designed.

7. During the event, the CWPs were secured and the four 10 percent steam dump valves opened to relieve steam generator pressure to the atmosphere.

III. Cause of the Problem

A. Immediate Cause

Units 1 and 2 were manually shutdown in accordance with guidance provided in OP AP-7, to prevent damage to the traveling screens due to sudden heavy debris loading.

B. Root Cause

The root cause of the event was sudden heavy debris loading on the circulating water system traveling screens during a period of high seas that dislodged plant life from the ocean bottom.

TEXT

C. Contributory Cause

None.

IV. Analysis of the Event

A manual reactor trip from 100 percent power is a previously analyzed Final Safety Analysis Report Update, Chapter 15, Condition II event. The 10 percent steam dump valves and the pressurizer controlled the reactor coolant temperature and pressure in accordance with plant design basis. Therefore, the health and safety of the public were not adversely affected by this event.

The event was not evaluated using the criteria defined in the NRC's Significance Determination Process because reactor trips are accounted for in the performance indicator program.

V. Corrective Actions

A. Immediate Corrective Actions

Plant personnel reviewed the plant equipment response following the manual reactor trips and confirmed that equipment operated within design requirements. Plant management initiated a event response plan to establish a controlled restart of plant systems following confirmation of decreased storm swell intensity.

B. Corrective Actions to Prevent Recurrence

PG&E cannot entirely eliminate the potential need to expedite manual reactor trips when high seas dislodge plant life from the ocean bottom resulting in heavy debris loading on the traveling screens.

1. PG&E reviewed intake management guidance to confirm the guidance is consistent with the lessons learned from this event.

2. PG&E reviewed operating crew tailboards for this event to confirm that plant operators were adequately informed of the actions expected during the storm warning condition.

3. PG&E reviewed operator training regarding equipment damage mitigation (coping strategy) to confirm adequacy for this event.

4. PG&E will designate an operations management team to focus on lessons learned and streamline the coping strategy decision making process during storm warning conditions.

VI. Additional Information

A. Failed Components

None.

B. Previous Similar Events

LER 2-98-005, "Manual Reactor Trip Due to Heavy Debris Loading of the Circulating Water System During a Pacific Ocean Storm," reported a Unit 2 manual reactor trip. On December 1, 1998, at 0347 PST, at approximately 100 percent power, plant operators initiated a manual reactor trip due sudden heavy debris loading on the intake water system traveling screens. Operating orders for storm conditions were revised, improvements to circulating water system indication in the control room were made, shift turnover guidance was enhanced, and additional training was provided to operators regarding lessons learned from this event.

LER 1-95-017-00, "Manual Reactor Trip Due to Heavy Loading of Traveling Screens," reported a Unit 1 manual reactor trip. On December 13, 1995, at 1033 PDT, at approximately 50 percent power, plant operators initiated a manual reactor trip due to heavy swells from a major Pacific storm. Additional screen rakes were added to the traveling screens to improve debris removal efficiency and plant operator training was provided.

LER 2-95-002, "Manual Reactor Trip Due to Heavy Debris Loading and Damage to Traveling Screens," reported a Unit 2 manual reactor trip. On September 23, 1995, at 0911 PDT, with Unit 2 in Mode 1 at approximately 40 percent power, plant operators initiated a manual reactor trip when the traveling screens stopped running due to debris loading. Corrective actions for this event included installation of new kelp rakes and revision of OP AP-7 to reduce or prevent damage to the traveling screens.

LER 2-94-012-00, "Manual Reactor Trip Due to Circulating Water Pump Cavitation as a Result of Intake Screen Fouling," reported a Unit 2 manual

TEXT

reactor trip. On December 19, 1994, at 1014 PDT, with Unit 2 in Mode 1 at approximately 35 percent power, a manual Unit 2 trip was initiated due to CWP cavitation due to intake screen fouling. Most of the corrective actions for the LER were focused on minimizing condenser fouling.

PG&E cannot entirely eliminate the potential need to expedite manual reactor trips when high seas and dislodged plant life from the ocean bottom result in heavy debris loading on the traveling screens. The corrective actions taken for the above previous events help mitigate the effects of debris loading but could not have prevented this event.